Permissible, Explosion-proof & Intrinsic Safety

PERMISSIBLE VS. EXPLOSION-PROOF

It is a common mistake to confuse “permissible” with “explosion-proof”. Permissible systems, pumps and controls are approved/certified by MSHA (Mine Safety & Health Administration) for use in explosive atmospheres, existing in underground mines.

Explosion-proof pumps, controls or systems are examined, tested and approved by FM (Factory Mutual Research) as such in conformance with NEC (National Electrical Code) requirements (Articles 500 through 503) as suitable for use in Class I, Division 1, Groups C and D, Class II, Division 1, Groups E, F and G and Class III, Division 1 hazardous locations.

INTRINSIC SAFETY

Intrinsic Safety (I.S.) is generally considered the safest method of operating electrical equipment in potentially explosive atmospheres.

As reliable alternative to explosion-proof enclosures, I.S. systems use approved instruments in explosive areas, connected to approved intrinsic safety barriers.

Intrinsically-safe equipment may be defined as “equipment and wiring which is incapable of releasing sufficient electrical or thermal energy under normal or abnormal conditions to cause ignition of a specific hazardous atmospheric mixture in its most easily ignited concentration.” This is achieved by limiting the power available to the electrical equipment in the hazardous areas to a level below that which will ignite the gases.

ADVANTAGES

The advantages of intrinsic safety over explosion-proof may be listed as follows:

1. Safety barriers (which are used to provide the intrinsic safety) are mounted in the safe location, usually a control room. No explosion-proof enclosures or conduit are necessary between the field device and the barrier; therefore, installation costs are lower.

2. Equipment can be calibrated and maintained with power applied.

3. No shock hazard exists since circuits are low power.

4. Since explosion-proof enclosures are not necessary, removal or improper replacement of explosion-proof enclosure covers is no longer a safety concern.

5. Intrinsic safety is suitable for all Classes, Divisions and Groups.

6. Intrinsic safety techniques are recognized internationally.

APPROVALS

In the U.S., the standards by which intrinsic safety is implemented are written by the National Fire Protection Association (NFPA). Typically, the I.S. products are listed or approved by Factory Mutual (FM) or Underwriters Laboratories (UL).

Factory Mutual uses two methods for approving equipment to be used in hazardous areas:

1. **Loop Approval**: This method is used when one specific device is used with one specific safety barrier. No other device or no other barrier may be used.

2. **Entity Approval**: Under this method, a device or barrier is approved for use with any other manufacturer’s device or barrier that is entity approved as long as it matches the electrical and safety parameters.

These parameters are:

- Maximum Inductance
- Maximum Voltage
- Maximum Capacitance
- Maximum Current